

Abdullah Ghunio¹

ROLE OF SCIENCE LABORATORIES IN PROMOTING CONCEPTUAL UNDERSTANDING OF STUDENTS AT ELEMENTARY LEVEL IN THE DISTRICT JACOBABAD

Abstract

This research explores important role of science laboratories and its practical usage at elementary schools level, by summarizing this research study how practical experiments work promote science education, the purpose of this research is to pay heed on the role of science laboratories and practical performances in Elementary schools. The sample will be taken using random sampling technique. Each school of the sample will be studied and surveyed. The case will be studied using surveys and questionnaires as research tool. 8-10 questionnaires containing different kinds of questions will be distributed for data collection. Post data of the questionnaires will be collected to check whether there is a role of laboratories or not. The data collected will be analyzed using descriptive statistics.

Key Words: *laboratory, practical, science, performance*

¹Ph.D. scholar, aghunio@gmail.com

Introduction:

An improving attitude toward an institute of education is important in today's setting of environment. To motivate and make students to perform well and better in schools can be accomplished by using the approach of creation of questioning minds through inquiry based science activities and laboratories. Young children and teenagers are naturally more inquisitive and inaugurate life as natural scientists (Louv, 2005).

The traditional technique of learning science is for example memorizing scientific formulae and doing exercises or listening or attending lectures are collectively common in practice. Nonetheless, with the presence of a variety of exceptional practices and advancements in practical sciences, science concept grasping and data analysis, leaning and teaching has become much more attractive, quicker and more effective (Saadon, *et al.* 2010).

Experimental study on the substantial universe leading to the encroachment is a foundation stone of the natural sciences. Surrounded by the science syllabus, the starring role of student's laboratory effort has shifted affectedly over the previous century. There have been a comprehensive and vast variety of scholastic purposes attributed to laboratory lessons and archeologically little disagreement about how it can be best support learning, even though the situation appears to be enlightening (Hofstein & Lunetta, 2004).

Significance of the study:

Laboratories are one of the significant structures of learning in the sciences at all stages. It would be intermittent to discover any science curriculum in any organization of education without a generous element of laboratory practices. Thus, the enlargement and enlargement of experimental abilities among the students are often a proposed justification. On the other hand, this dispute is needed to be questioned to rationalize the position or part of the laboratory in the field of science education (Reid and Shah, 2007).

Literature Review:

Hanuscin D. L. (2007) is the one who raised the important question about the importance of laboratory practice in Elementary school level. According to the him the reforms called for elementary science that occupied students in significant and relevant educational opportunities for all scholars. While science laboratory services were found to be common to middle and high school, in elementary schools, science is being taught in the traditional common classrooms. Elementary schools across the country, however, had used economic and other resources for the formation of separate laboratory facilities for science. The question raised was "How do these practices support elementary science education and support in meeting the revelation of the reforms? The lack of information due to deficiency of study in this aspect was advised be addressed to facilitate districts to make informed choices about whether to distribute funds to establishing discrete facilities or providing and furnishing regular classrooms for elementary science education.

Townsend, (2012) presented an action study. Reason behind performing this action study was to find out and evaluate the special effects of laboratory-based activities on student approaches and progress toward science. For the persistence of this study, the students of V class were being taught science above a period of five months which includes the regular science syllabus for the school area, labs from the science sequence, and extra labs equivalent to the topics in the set of courses that were prepared and maintained by the teacher or other professionals. Students were given questions and surveys at the end of the five-month duration. Surveys and questions consist of questions about preferred subjects, what was finest about science, and how the scholars comprehend science. Remarks on what type of laboratory activity was most beneficial to enhance understanding and what sort of laboratory practice or activity was favored were surveyed. The importance of using laboratory activities to motivate and increase comprehension of science in V grade was clear not only in survey outcomes but from the remarks of the students as well.

Hofstein A. and Lunetta V. N. (2003) suggested that the laboratory had been playing a central and distinguishing role in science teaching, and science educationalists had suggested that benefits in education increase by using laboratory practices. In 1982 they presented a frequently cited, critical review of study about the school science laboratories. Twenty years have been elapsed since we published a frequently cited, critical review of the study on the school science laboratory and 20 years later they both presented this thesis in 2002, an era of revolution and dramatic progress in technology and new standards in

science which has regarded the inquiry learning a central position. According to the study, they expounded that the methodologies and procedures for study and valuation that had developed in the last 20 years could help scholars to understand how science laboratory resources could be used, how students' performance in the laboratory could be assessed, and how teachers could use the science laboratory activities to heighten intended learning results. In that context, they took another view at the school laboratory in respect of contemporary practices and scholarship. This analysis evaluated scholarship that had emerged in the past 20 years, up-to-date goals for science learning, current prototypes of how students build knowledge, and information about how educators and scholars engaged in science laboratory activities.

Alexiou A., (2001) presented a study shows the importance and benefits of laboratories and practical education in primary and elementary schools. It gives solution regarding problems in establishing laboratories. Practical practice is an integral element of the educational development. However, economical assets and the time often compulsory for the assembly and setting up of scientific laboratories were outside the scope of many foundations..

Said Z. *et al.*,(2014) presented a paper that finds the process by which practical actions were perceived and continued in Qatari schools, and recognized existing obstacles and supporters for their application from the view of science teachers. The study was based on an evaluation of 179 science educators from almost 50 different institutions as well as interviews of 36 educators signifying primary,

secondary and preparatory schools. The results show that all these factors were important with a bit significant alteration between their contributions. Likewise, factors motivating effective delivery were equally important with close percentages amongst responses. They were in descending order. Outcomes from both interview and surveys presented that educators consumed about 25% of the time apportioned for science classes, on practical; nevertheless, assessment weighting percentages were being between 10-15% of the overall mark of the subject.

Ogunmade T. O. (2005) finds out and described the position and excellence of secondary science education and learning in Lagos State, Nigeria. Qualitative and quantitative methods were being used for collecting study data. That Quantitative data were collected from the investigations of 78 junior secondary science educators and 500 junior secondary learners from the three Local Education Districts of Lagos State. Quantitative data was being calculated and analyzed by source of the SPSS 13.0 statistical platform to create descriptive statistics. Qualitative data was also being transliterated and characterized into the developing themes. Results from this study shows a gap between genuine science coaching, learning and a perfect school science with in respects to curriculum, instruction and learning, class sizes and resource apportionment, talents, teacher knowledge, and approach, abilities, and professional expansion, and community maintenance.

Objectives of the study:

The objective of the study is to develop a clear understanding on the importance and significance of the laboratory education and practices in Elementary schools of

the district Jacobabad. The other important objective of the study is to motivate the schools to improve the laboratories and practical work in elementary schools.

Research Methodology

The Research conducted is “descriptive research” regarding the nature and scope of the study. Descriptive study is applied to designate characteristics of a population or occurrence under studied.

Testing of Hypothesis:

It is hypothesized that there is a strong “Role of scientific laboratories in Elementary schools of Jacobabad.

Population:

The population for the purpose of study was all the elementary schools in district Jacobabad. The population for the study was large and it was very difficult to study all schools so a sample was selected.

Sample and Sampling technique:

Due to the shortage of time and resources the population was narrowed down to subpopulation and the sample consisted of 10 elementary schools of Jacobabad. The technique used for sampling was probability sampling in which each and every member of the population has equal chance to be selected in the subpopulation. Each school of the subpopulation was studied separately.

Study Instrument:

The survey was performed using question of different kinds. The questions were distributed among science subject teachers and students of the sample schools. 10 questions were designed for distribution and data collection.

Data collection procedure:

The question distributed was collected and checked. The data was collected and written down and saved in percentages for each question separately.

Study Questions:

Followings are the questions arising:

- Is there any requirement for the development of the science laboratories in Elementary schools of the region or not?
- Does the use of scientific laboratories have positive learning effects on the pupils?
- Do the practical and experimental practices increase the cognitive abilities of the students?

Validity and reliability:

Validity of the data collection mechanisms in this study was done by the questions. This enabled the researcher recognize whether the instrument organized is capable enough to capture the data that is required.

Delimitation of the Study:

The data has been collected for the purpose through descriptive study method by using question. Due to the lack of time and scarce resources, 10 elementary schools of the region were randomly selected as samples. Almost not even single Elementary schools of Jacobabad have separate science laboratories, while High and Higher Secondary Schools do have labs but Elementary students are not allowed to go in labs and perform practically.

DATA ANALYSIS AND INTERPRETATION:

The data collected from the questions was interpreted and analyzed as follows:

Question1: “What do you like best about science?
 (a) Books (b) Lectures (c) Lab work”

The data collected from the questions was analyzed statistically using SPSS and following values were obtained:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
A	10	10.00	45.00	26.0000	10.60398
B	10	10.00	40.00	25.4000	8.07190
C	10	30.00	65.00	48.6000	11.86217
Valid N	10				

Table 1.1 Descriptive values for table 1.1

The table and mean of the three variables showed that students showed more interests in lab work.

Question2: “Has your attitude or feeling about science changed this year or not?
 “Yes No”

The data collected from the question was analyzed statistically using SPSS:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	22.00	61.00	40.1000	13.64999
No	10	39.00	78.00	59.8000	13.75015
Valid N (listwise)	10				

Table 1.2 Descriptive values for table 1.2

The table and mean of the three variables showed that student behavior towards science has not changed.

Question3: “What is the best way for you to learn science?
 (a)Experiment (b)Theory/Book”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
A	10	45.00	90.00	71.2000	16.35577
B	10	10.00	55.00	28.8000	16.35577
Valid N (listwise)	10				

Table 1.3 Descriptive values for table 1.3

The table and mean of the two variables showed that student shows more interest in experimenting than lectures and theory.

Question4:“Have you ever performed any practical or experimentations in classroom or

field?

Yes

No”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	22.00	61.00	41.5000	12.60732
No	10	39.00	78.00	59.4000	12.88582
Valid N	10				

Table 1.4 Descriptive values for table 1.4

The table and mean of the collected data showed that students usually do not perform experiments in classrooms and field.

Question5:“Are you provided with separate laboratories in schools?

Yes No

The data collected from the questions was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	.00	8.00	1.3000	2.58414
No	10	92.00	100.00	98.7000	2.58414
Valid N	10				

Table 1.5 Descriptive values for table 1.5

The table and mean of the collected data showed that the percentages of laboratories in elementary schools is very low and is almost near to zero and most schools do not have separate room to perform experimentally.

Question6:“Are you provided with any sort of scientific apparatuses and equipment to be used in class while studying?

Yes

No”

The data collected from the questions was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	20.00	62.00	47.3000	13.63859
No	10	38.00	80.00	53.5000	14.99815
Valid N	10				

Table 1.6 Descriptive values for table 1.6

The table and mean of the collected data presented that some classes at some schools are being provided with scientific apparatuses and equipment.

Question7:“Do you think that the practical work enhances your cognitive abilities?

“Yes

No”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	90.00	160.00	118.1000	19.66073
No	10	40.00	110.00	81.9000	19.66073
Valid N	10				

Table 1.7 Descriptive values for table 1.7

The table and mean of the collected data represented that experimentation had strong cognitive effects on the students.

Question8:“Science is easier to teach in laboratories using experimentations?

- (a) Somewhat agree
- (b) Agree
- (c) Strongly agree
- (d) Disagree
- (e) Strongly disagree”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
A	10	8.00	19.00	12.0000	3.88730
B	10	10.00	42.00	27.9000	8.46496
C	10	10.00	43.00	28.7000	10.59402
D	10	9.00	32.00	17.8000	8.32399
E	10	8.00	25.00	13.6000	6.09554

Table 1.8 Descriptive values for table 1.8

The table and mean of the collected data showed most of the educators thought that teaching while doing practical is easier than the traditional methods.

Question9:“Do you think that students can grasp and learn scientific concepts in a more effective way while experimenting?”

“Yes

No”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Yes	10	45.00	85.00	64.6000	12.78193
No	10	15.00	55.00	35.4000	12.78193
Valid N	10				

Table 1.9 Descriptive values for table 1.9

The table and mean of the collected data showed that majority of educationalists had an opinion that it is easier to grasp clear scientific concepts when performing practical.

Question10:“What do you think students pay more attention and interest to?

(a) Labs(b) Lectures/theory”

The data collected from the question was analyzed statistically using SPSS and following values were obtained:

	N	Minimum	Maximum	Mean	Std. Deviation
Labs	10	40.00	76.00	54.9000	10.24641
Lectures	10	24.00	60.00	45.1000	10.24641
Valid N	10				

Table 1.10 Descriptive values for table 1.10

The table and mean of the collected data represented that according to teachers’ students shows more interests in labs as compared to the class lectures.

Findings and Results:

All the questions showed different results which can be described as follows:

The first question was distributed to get to know about the preferences of students about learning science and what they feel more interest in. The data consisted of three variables and analysis was done using SPSS. The means obtained for “Books”, “lectures” and “labs” were 26, 25.40 and 48.60 respectively. The values obtained resulted in the greater mean for the “labs”.

The second question was distributed to get to know

about the approaches of students and to know if these approaches and attitudes have changed or not with the advancement and progress in science. The data collected was consisted of two variables and analysis was done using SPSS. The means obtained for two variables were 40.10 and 59.80 respectively. The resulting values resulted in favour of the “No” change occurred in the attitude of students towards science.

The question no. 3 was distributed to get to know about the choice of students to learn science and its concepts. The data consisted of two variables and analysis was done using SPSS. The means obtained for “Experiment” and “theory” 71.20 and 28.80 respectively. The values obtained resulted in the greater mean for the “experiments”.

The fourth question was distributed to get information about the past labs experiences of students if they have performed any experiments of any kind in classroom or field while studying science. The data consisted of two variables and analysis was done using SPSS. The means obtained for two variables were 41 and 59 respectively. The mean values and pie-chart distribution obtained resulted in the greater values for the “no”. However, data for “yes” was also collected but showed a lower mean of 41.

The fifth question was distributed to get information whether the labs are established in schools or not. The data consisted of two variables and analysis was done using SPSS. The means obtained for two variables were 1.30 and 98.70 respectively. The mean values and pie-chart distribution obtained resulted in the greater values for the “no”. However, data for “yes” was also collected but

resulted in a very little percentage.

The question no. 6 was designed to get information the schools and classes are provided with some lab apparatuses and equipment to be used while reading or during lectures. The data collected consisted of two variables and analysis was done using SPSS. The means obtained for two variables were 47 and 53 respectively. The mean values and pie-chart distribution obtained resulted in the greater values for the "no". However, data for "yes" was also collected but showed a lower mean of 47.

The seventh question was designed to get information about the past labs experiences of students that if they have performed any experiments of any kind in classroom or field while studying science, does it increase their cognitive abilities. The data consisted of two variables and analysis was done using SPSS. The means obtained for two variables were 118 and 81 respectively. The mean values and pie-chart distribution obtained resulted in the greater values for the "yes".

The 8th question was distributed to teachers to know how they feel about the importance of science labs or practical work that if they agreed that teaching science was easier in labs. The data consisted of five variables and analysis was done using SPSS. The mean values and pie-chart distribution obtained resulted in the greater values for the "agree".

The ninth question was again distributed to teachers to get information about the effectiveness of labs that if students performed any practical would that make it easier for students to grasp the concepts of science. The data consisted of two variables and analysis was done using

SPSS. 65% teachers resulted in “yes”.

The last question was distributed to have teacher’s views about students’ approach towards science learning that what students pay more attention to. The data consisted of two variables “lectures”, “labs” and analysis was done using SPSS. The means obtained for two variables were 45 and 55 respectively. The mean values and pie-chart distribution obtained resulted in the greater values for the “labs”.

Conclusion

At the start of the study I thought students to establish their attitude for science. I noted that they were at current quite passionate for science subject and that most of them elected science as a favorite subject. I started to get nervous that I would not see recognizable results in my study. Nevertheless, I did see positive results that sustained my opinion. By the use of all the questions I ended with following conclusions:

From the first question it was determined that most of the students liked labs more than books and lectures. From the second question it was concluded that student’s approach attitude has not been changing with the change in science. From 3rd and 4th questions it is pretty clear that students find experiments and practical work a better source and experience for science learning. But unluckily the schools do not have any laboratories separately established for students to work practically and there are number of scientific apparatuses are being provided in classes which are not enough. According to the interpretations of teachers and students, the experimenting has proved to be more effective and efficient in teaching and learning science and it

enhances the cognitive abilities of not only students but the teachers as well. From the data we are being resulted with it is also concluded that teachers are of an opinion that labs would help students to understand and comprehend the science concepts in an effective and better way.

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